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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,471	02/08/2002	Paul A. Koning	42390P12137	9970

7590 07/28/2004

Michael A. Bernadicou
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025-1030

EXAMINER

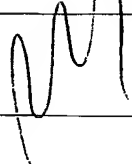
DUONG, THO V

ART UNIT PAPER NUMBER

3743

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/071,471	Applicant(s) KONING ET AL.	
	Examiner Tho v Duong	Art Unit 3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-13,15-17,19,26 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-13,15-17,19,26 and 27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Receipt of applicant's amendment filed 4/19/2004 is acknowledged. Claims 1,3,5-13,15-17,19 and 26-27 are pending.

Response to Arguments

In view of applicant's amendment filed 4/19/2004, the 112th first paragraph rejection over claim 12 and the 102 (a) rejection over claims 1,6,9-11 and 19 are now withdrawn. Since the subject matter of claim 14 is incorporated into the original claim 1, a new ground of rejection on claims other than claim 1 is necessitated by applicant's amendment.

Applicant's arguments filed 4/19/2004 have been fully considered but they are not persuasive. Applicant argues that since Kang discloses an optimal powder size of 5-7 microns and 0.3- 0.5 micron in coating and reference to Squitieri teaches a particle size ranging from 1-50 microns, the teaching of Kang and Squitieri are incompatible with one another and there can exist no motivation to combine such teachings. In response to applicant argument, the examiner wants to point out that reference Kang does not teach away from having other dimensions different from 5-7 microns. The dimension 5-7 microns and coating thickness of 0.3- 0.5 microns are just a preferred embodiment of Kang's invention. While Kang is silent about other dimension of the filler material, reference to Squitieri (column 3, line 66- column 4, line 28) teaches of having particle fillers, which is used in thermal interface material, ranges between 1 to 50 microns in means diameter for the purpose of not distorting the surface of the thermal interface material. Since Kang and Squitieri are both from the same field of endeavor and/or analogous art, the purpose disclosed by Squitieri would have been recognized in the pertinent art of Kang. Likewise, regarding the volume percentage of the non-fusible particle and fusible

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filler, reference to Kang does not teach away from having other dimension different from 0.3-0.5 microns in thickness of the fusible filler. The dimension of coating thickness of the fusible filler of 0.3-0.5 microns is just a preferred embodiment of Kang's invention, which implies that other dimensions is also available. While Kang is silent about the volume percentage of the particle and the fusible filler, reference to Koning (column 3, line 20- column 4, line 25) teaches of having a thermal interface material so that the volume percentage between the fusible filler coated on to the non-fusible particle is between 30-70% for the purpose of ensure the fusible material being in the continuous phase so that a good electrical or heat transfer property of the thermal interface material is retained. Since Kang and Koning are both from the same field of endeavor and/or analogous art, the purpose disclosed by Koning would have been recognized in the pertinent art of Kang. As regarding the argument about defeating the purpose of coating in Kang, since Kang does not teach away of having other dimensions of the particles and of the fusible filler, having other dimensions different than the preferred embodiment will not defeat the purpose of the coating in Kang. On the other hand, Kang discloses (column 4, lines 1-3) that the particle size and volume fraction of the filler material can be adjusted depending on the application of the material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,3,5-13,15-17,19, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (US 6,114,413) in view of Squitieri (US 4,869,954) and Koning (US 6,365,973). Kang discloses (figures 1-3,5, column 2, lines 59-63 and column 4, lines 28-36) that a thermal interface material comprising a polymer paste material (polymer) acts as an adhesive; a fusible filler (Sn) coated onto a plurality of non-fusible particles (Cu) which has a sphere shape or a non-uniformly shape; and the pre-coated non-fusible particles randomly positioned within the binder material. Kang further discloses (column 6, lines 44-49) that the fusible filler can be Sn, In, Bi, Sb and their alloys while the non-fusible particles can be copper or diamond. It is well known in the art that tin has a melting point at 120C degrees; indium at 159C degrees and copper or diamond has thermal conductivity greater than the thermal conductivity of tin. As regarding claim 16, applicant discloses on page 11, paragraphs 31,32 that tin and indium selected to use as the claimed fusible material, which has the claimed properties. Therefore, it is inherently that either tin or indium disclosed in reference of Kang to have the property such as "stable to oxygen at temperature up to approximately 150C and relative humidity up to approximately 90%". Kang further discloses (column 6, lines 39-43 and claim 26) that the relative amount of the coated filler varies from 30 to 90% by weight of the thermal interface material. Kang substantially discloses all of applicant's claimed invention as discussed above except for the limitation that a mean diameter for conductive fillers can be approximately 25 microns. Squitieri discloses (column 3, line 66-column 4, line 28) a thermal interface materials having conductive fillers embedded within a binder, wherein the conductive fillers has a particle size from 1 micron to about 50 microns so as not to distort the surface of the thermal interface material. It would have been obvious to one having ordinary skill in the art at the time

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the invention was made to select the conductive filler's size from 1 micron to about 50 microns so as not to distort the surface of the thermal interface material. Kang and Squitieri substantially disclose all of applicant's claimed invention as discussed above except for the limitations of volume ratio between the fusible filler to non-fusible particles. Koning discloses (figure 3 and column 3, line 20- column 4, line 25) a thermal interface material (138) that has fusible and non-fusible fillers embedded in a binder material wherein the volume ration between the fusible and the non-fusible particles is between 30-70% to ensure the fusible material being in the continuous phase so that a good electrical or heat transfer property of the thermal interface material is retained. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Koning's teaching in the combination device of Kang and Squitieri to ensure the fusible material being in the continuous phase so that a good electrical or heat transfer property of the thermal interface material is retained. As regarding claims 11 and 12, Kang, Squitieri and Koning substantially disclose all of applicant's claimed invention as discussed above except for the limitations regarding the weight percentages of the fusible filler or the non-fusible particle over the thermal interface material. Kang discloses (column 6, lines 30-49 and claim 26) the weight percentage of the coated filler over the thermal interface material is 30-90 %. Since applicant does not disclose any criticality, or for any particular purpose or for solving any stated problem of the claimed weight percentages, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the claimed range of physical composition such as weight and volume between the fusible and the non-fusible particle in view of Kang, Squitieri and Koning, since it has been held that where the general condition of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only

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routine skill in the art. In re Aller, 105 USPQ 233. Furthermore, one of ordinary skill in the art, would have expected applicant's invention to perform equally well with the physical composition between the fusible and non-fusible material of Kang in view of Squitieri and Koning because Kang's fusible filler in view of Squitieri and Kong has a sufficient amount to completely coat over the non-fusible material in a continuous phase and not to distort the surface of the thermal interface material.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tho Duong whose telephone number is (703) 305-0768. The examiner can normally be reached on from 9:30-6 PM.

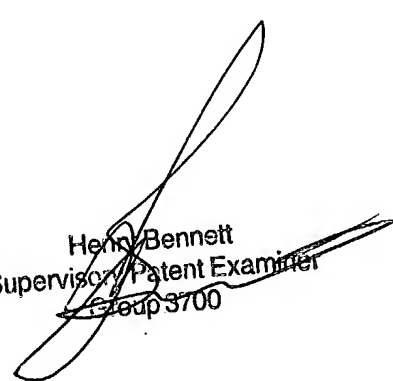
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet, can be reached on (703) 308-0101. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

Tho Duong

July 21, 2004



Henry Bennett
Supervisor Patent Examiner
Group 3700